

Thus intrauterine injection of carbon-mineral adsorbent promotes restoration of volume relationships in the microcirculatory bed and of disturbances of vessel-tissue interaction during inflammation in the endometrium and myometrium, essential steps for realization of the reproductive function of the uterus.

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MODIFICATION OF THE STRUCTURE OF FOCI OF REGENERATION OF DERMAL TYPE IN RATS

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KEY WORDS: wound healing, regeneration of skin, graded mechanical injury.

It has now been shown that mammalian skin is capable not only of scar formation, but also of organotypical regeneration [2, 3]. Completeness of regeneration of the skin depends on the species of animal, the site of the wound defect, and a number of experimental conditions [2-4]. It has also been shown that the course and outcome of the healing process in the skin can be modified in certain directions [1, 3]. In this connection the method of graded mechanical injury (GMI) of newly formed foci of regeneration (FR) of the skin has proved to be promising, for in some cases, instead of scar tissue, FR closely similar in structure to intact skin have been obtained on the dorsal region in mice [6].

The aim of this investigation was to determine whether FR of dermal type can be modified in structure by the GMI method. FR of dermal type are formed as a result of healing of full-thickness skin wounds on the abdominal surface of the mammalian trunk. In FR of dermal type elastic fibers are formed, but derivatives of skin as a rule do not appear [5].

EXPERIMENTAL METHOD

Experiments were carried out on 73 noninbred male albino rats weighing 120-130 g. After epilation, full-thickness square wounds measuring 1.5×1.5 cm were inflicted by means of a stencil on the mid-abdominal skin of all the animals. On the 3rd day after total epithelization of the wound defect, which took place on the 7th-9th day after infliction of the wound, FR of 51 animals were subjected to GMI by means of a needle, at the rate of 10 full-thickness punctures 1 mm^2 of epithelized surface of FR (diameter of needle 0.1 mm).

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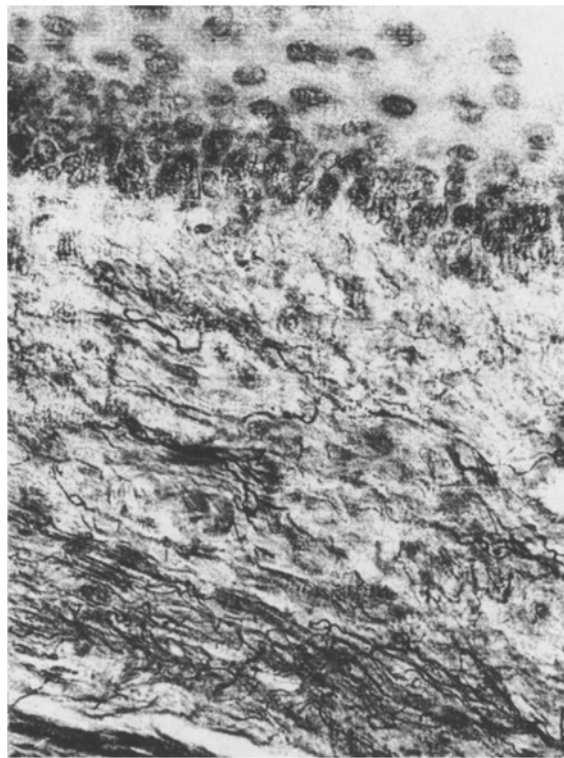


Fig. 1. Elastic fibers in FR 9 days after wounding.
Orcein. 360 \times .

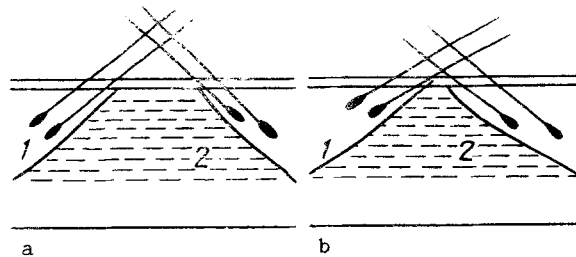


Fig. 2. Diagram showing dermis adjacent to wound entering zone of defect. Nine days after GMI of FR, b) 13 days after GMI of FR. a) Control, b) experiment. 1) Wedge of dermis, 2) FR.

In 22 animals FR were not subjected to GMI (control group). All operations were performed under ether anesthesia. Areas of FR were measured at consecutive times of their secondary healing. Pieces of FR and adjacent skin were taken for comparative morphologic study, fixed in carnoy's fluid 0, 5, 7, 13, and 27 days after GMI, and embedded in Paraplast. Histologic sections 8-12 μ thick were stained with hematoxylin and eosin and with picro-fuchsine by Van Gieson's method and with orcein.

EXPERIMENTAL RESULTS

At the time of GMI the epithelized surface of FR had the appearance of stripes 2.5-3 cm long and 1.8 ± 0.2 mm wide, oriented perpendicularly to the long axis of the animal's trunk. The area of FR was 5-6% of the area of the original defect, and subsequently it did

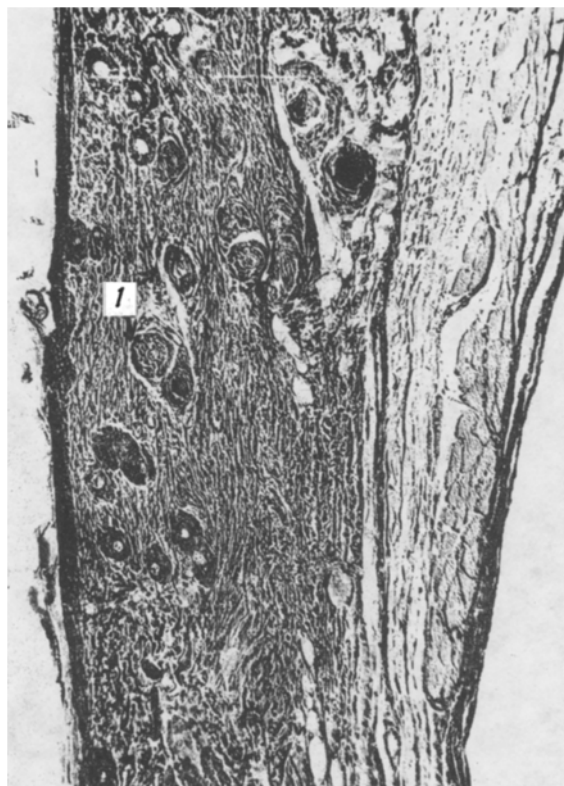


Fig. 3. FR 13 days after GMI. 1) Hair follicles. 100 \times . Picrofuchsin by Van Gieson's method.

not decrease. In vertical sections through FR it was clear that its connective-tissue base consisted mainly of thin collagen fibers, which formed a network with narrow mesh. In the peripheral parts of FR, and throughout its thickness, elastic fibers were found (Fig. 1). In the center of FR the elastic fibers were distributed only in its upper layers. In the upper peripheral layers of FR, small wedge-shaped areas of dermis could be seen growing from the wound edges, and which because of contraction advanced into the zone of the defect; they were $240 \pm 60 \mu$ long.

In the early stages after GMI of the FR (5 and 7 days), as a result of secondary contraction, their width was reduced to 1.4 ± 0.3 and 1.2 ± 0.25 mm respectively, compared with 1.8 ± 0.5 and 1.8 ± 0.35 mm in the control. In the early stages, separate bundles of hair could be seen visually in FR, where they were arranged both at the periphery and in the center. In vertical sections, considerable wedges of dermis could be seen in FR on the 7th day, threading into the zone of the defect as a result of secondary contraction; their length was $790 \pm 110 \mu$, compared with only $250 \pm 65 \mu$ in the control. The hair follicles in these wedges were inclined toward the defect, and for that reason their rods projected on the surface in the region of FR (Fig. 2a).

On the 13th day after GMI the width of FR was not 1.0 ± 0.25 mm (1.8 ± 1.5 mm in the control). Examination of vertical sections through the region of the defect showed that areas of FR were present only in the form of islands, scattered between wedges of dermis drawn into the defect, which were no longer distinctly shaped, but in some places were merged together in the center of the defect (Fig. 2b). Many hair follicles, surrounded by a network of fibers, could be seen in the dermis advancing into the zone of the defect (Fig. 3).

On the 27th day after GMI (35 days after wounding) the width of FR was virtually unchanged compared with the previous period (13 days) at 1.0 ± 0.35 mm; in the control; however, the width of FR was reduced to 1.2 ± 0.25 mm (the width of the control FR at the previous time was 1.8 ± 1.5 mm). In both experiment and control at this time, small areas of FR surrounded by dermis could be seen in the zone of the defect.

Thus graded mechanical injury enables the intact abdominal skin surrounding the defect to be involved in the process of its repair, and also considerably speeds up the formation of the definitive focus of regeneration.

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MORPHOLOGICAL AND FUNCTIONAL CHANGES IN THE KIDNEYS IN THE EARLY STAGE OF VENOUS STASIS AND DURING RESTORATION OF BLOOD DRAINAGE FROM THE ORGAN

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KEY WORDS: venous stasis; intrarenal veins; regional renal blood flow.

Kidney diseases associated with obstructed venous drainage from them are found comparatively frequently [4, 8]. Most investigations in this field have been devoted to the study of disturbances of kidney function [2, 3, 5, 6, 9-11]. Restorative processes in the kidneys after correction of venous stasis have not yet been adequately studied [7]. By using light-optical, electron-microscopic, and radioisotope methods we have studied changes in the intrarenal veins and structural elements of the kidney after experimental constriction of the renal vein, in the early stages, and also repair processes after restoration of the venous drainage from the kidney.

EXPERIMENTAL METHOD

Experiments were carried out on 30 noninbred adult male and female albino rats weighing 180-210 g. Under pentobarbital anesthesia and under sterile conditions, after midline laparotomy the lumen of the left renal vein was constricted by 50%, by tying the vein over a metal tube of the required diameter distally to the point of entry of the adrenal and gonadal veins. The creation of an obstructed venous drainage was judged by the increase in volume of the kidney, and dilatation of the segment of the vein distal to the ligature. Material for light-optical and electron-microscopic investigation was collected on the 3rd day after constriction of the vein, and also on the 30th day after removal of the ligature and restoration of the venous drainage. The intrarenal veins were subjected to morphometry, with measurement of their external and internal diameter and the thickness of their wall. The regional renal blood flow was determined with the aid of the radioactive gas ^{133}Xe on an "Ksenon-3" apparatus [1]. The results were subjected to statistical analysis.

EXPERIMENTAL RESULTS

The results showed that 3 days after constriction of the left renal vein, the mass of the kidney was significantly increased (1028.41 ± 51.13 compared with 745.15 ± 32.40 g in the control). Macroscopically the kidney was swollen, the fibrous capsule was stretched, and the kidney was dark violet in color. On frontal section foci of hemorrhage were found

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